Address of the President, Lord Rayleigh, O.M., D.C.L., at the Anniversary Meeting on November 30, 1907.

Since the last Anniversary the Society has sustained the loss of twenty-five Fellows and three Foreign Members.

The deceased Fellows are:—

Thomas Andrews,
Sir Benjamin Baker,
Sir Dietrich Brandis,
Sir William Henry Broadbent,
Dr. Alexander Buchan,
Lord Davey,
Dr. August Dupré,
Sir Joseph Fayrer,
Sir Michael Foster,
Sir William Tennant Gairdner,
Lord Goschen,
Sir James Hector,
Prof. Alexander Stewart Herschel,
Rev. John Kerr,
Sir Leopold McClintock,
Dr. Maxwell Tylden Masters,
Prof. Alfred Newton,
Cornelius O'Sullivan,
Sir William Henry Perkin,
Dr. William Henry Ransom,
Sir Edward James Reed,
Dr. Edward John Routh,
Henry Chamberlaine Russell,
Prof. Charles Stewart,
Robert Warington.

The Foreign Members are:—

Marcellin Berthelot, Dmitri Ivanovitch Mendeleeff, Henri Moissan.

From the length of this list it will be seen that death has been unusually busy during the year. It includes many names of great distinction, of whom I can refer only to a few.

Sir B. Baker was a Councillor at the time of his death, and was well known among us as a frequent attendant at our meetings and as combining scientific interests with the highest degree of successful practice in his profession. The recent catastrophe in America will, perhaps, even enhance his reputation as the designer of the Forth Bridge.

In Sir Michael Foster we have lost one, to whom probably more than to anyone else the present position of our Society is due. For 22 years he held the office of Secretary, during about half of which time I was his colleague. It would not be too much to say that the interests of the Society and a desire to extend its usefulness were never out of his mind. It was inevitable that his pronounced views and his energy in giving effect to them should occasionally arouse opposition, but he was impelled always by public spirit, sometimes to the detriment of his own private interests. His work for Cambridge, for the Government in commissions of inquiry, as well as for the Society, constitute a lasting claim upon the gratitude of our generation.

The name of Kerr will go down to posterity as the discoverer of two remarkable phenomena in Electro-Optics. His success is a good example of what may be accomplished under no small difficulties by courage and perseverance.

The claims of Sir W. Perkin as the pioneer in the aniline industry and as a distinguished worker in scientific chemistry have recently been celebrated, and are recognised all over the world. It is satisfactory to reflect that, unlike many inventors, he met with full appreciation during his lifetime.

Dr. Routh's name is one that I cannot allow to pass without a word. I was indebted to him for mathematical instruction and stimulus at Cambridge, and I can still vividly recall the amazement with which, as a freshman, I observed the extent and precision of his knowledge, and of the rapidity with which he could deal with any problem presented to him. His book on Dynamics is well known. In its earlier editions it illustrated, perhaps, rather the vices than the virtues of the Cambridge School, but it developed later into a work of first-rate importance. I have always been under the impression that Routh's scientific merits were underrated. It was erroneously assumed that so much devotion to tuition could leave scope for little else.

On the foreign list we have to lament three chemists of high distinction, Berthelot and Mendeleeff, though still active, had attained old age; but in Moissan we lose one from whom much more might have been expected. All three have been recipients of our medals.

An important feature in the work of the Royal Society consists of various enquiries, undertaken for different Departments of Government, in regard to diseases which affect the tropical portions of our foreign possessions and dependencies. Among these diseases the attention of the civilised world has been for some years directed to the malady known as Sleeping Sickness. The first concerted action for the study and combating of this apalling scourge arose out of a representation made by the Royal Society to the Foreign Office in the spring of 1902, in consequence of which, at the request of the Treasury, the Society's Malaria Committee organised and despatched a small scientific commission to Uganda. In the course of a short time the source of the disease was traced by this Commission to the presence of a trypanosome in the blood and cerebro-spinal fluid of the victims, and the further discovery was also made by the same Commission that the trypanosomes are carried by a species of biting tsetse-fly. These important revelations were followed up by detailed studies of the character and distribution both of the disease and of the fly. Besides sending out a succession of observers to prosecute the investigations of its Commission at Entebbe, the Royal Society urged upon the Colonial Office the necessity of organising, and under an increased

medical staff, a more comprehensive enquiry into the local conditions under which the disease is propagated. This recommendation was carried out and some valuable information on the subject has been obtained. Meanwhile, though various drugs had been tried with at best only temporary success, no lasting remedy had been found for the malady, which has continued to be fatal and to spread steadily over Central and East Africa. The various European Governments which have possessions in those regions have at last determined to make a united effort to cope with Sleeping Sickness through the instrumentality of an International Conference having a separate bureau in each country concerned and a central bureau in London. The object of this co-operation will be to collect information bearing on the disease, to devise and carry out such scientific researches as may seem to be necessary and to concert measures for dealing with the disease and the populations affected or likely to be affected by it. The Royal Society, having led the way in this subject, has been invited to give the proposed combined international action its support. The Society welcomes the proposal and will be prepared to render every assistance in its power. In the meantime our Tropical Diseases Committee is continuously and actively engaged in the endeavour to discover a drug that may prove effective in the treatment of the disease. Their investigations have been directed to the study of trypanosomiasis in rats and the latest results obtained are such as to encourage the hope that at least in this direction their labours have been successful.

During the present year three parts of the Reports of the Society's Mediterranean Fever Commission have been published, embodying the final observations and conclusions in this important enquiry, which was undertaken at the joint request of the Admiralty, War Office, and Colonial Office. It is not often that a difficult investigation of this kind can be brought to a successful conclusion in so short a time as two years and a-half, and the various members of the Commission are deserving of the warmest commendation for the skill, zeal, and promptitude with which they have solved the problem submitted to them. They have shown how the scourge of fever, which has been so long rife in Malta, and has so seriously reduced the strength of our garrison there, may be eventually banished from the island. Already their recommendations, so far as they have been followed, have reduced the amount of fever to trifling proportions. It now remains for the authorities to adopt the further precautions pointed out to them, which will probably banish the disease altogether.

I have continued to preside at the Meetings of the Executive Committee of the National Physical Laboratory.

The work of the Laboratory has grown greatly during the year. The addition to the Engineering Building and the new building for Metallurgical Chemistry are completed and are now occupied, while the building for Metrology is very nearly finished.

A new 100-ton testing machine, one of Messrs. Buckton's latest patterns, has been installed, and the increased accommodation in the Engineering Laboratory enables the work there to proceed more easily and rapidly.

Great progress has been made in the equipment of the Electro-technical Laboratory, and research and test-work can now go on there in a rapid and systematic manner.

The question of the Commercial Testing undertaken by the Laboratory has been the subject of investigation by a Treasury Committee, before which I was summoned to give evidence. It is understood that the report of this Committee may be expected shortly.

Progress has been made with the buildings at Eskdale Muir, some of which are now ready for occupation. It was hoped that the work might have begun this summer, and the Treasury have provided a sum of £750 for the expenses during three-quarters of the current financial year. Owing to the bad weather in the early summer this anticipation has not been realised, but a start will be made very shortly. The buildings are admirably adapted for their purpose, and will render possible the study of terrestrial magnetism under the undisturbed conditions which used to exist at Kew.

A list of the more important researches is published in the Report of the Laboratory. Among these may be mentioned those by Dr. Harker on the Kew Scale of Temperature and its relation to the International Hydrogen Scale; Mr. Paterson's paper, read before the Institution of Electrical Engineers—"Investigations of Flame Standards and the Present Performance of High-voltage Lamps"; and the eighth report of the Alloys Research Committee, by Dr. Carpenter and Mr. Edwards, on the Properties of Alloys of Aluminium and Copper. Professor Ayrton, Mr. Mather, and Mr. Smith have finished their work on the Ampere Balance, and the paper is now being published in the 'Philosophical Transactions,' while papers on the Silver Voltameter and the Weston Cell are also in the press.

Dr. Stanton and Mr. Bairstow have completed a further research on the measurement of wind pressure, and are well advanced with the investigation into methods of impact-testing.

Other researches in progress are those on the measurement of small inductances and capacities, with a view to the standardisation of the wave-lengths used in wireless telegraphy, on alloys of copper, aluminium, and manganese, for the Alloys Research Committee, and on the properties of eutectics.

The completion of the work on the electrical units will be satisfactory to those who have been interested in this question. At the time of my own researches about twenty-five years ago, the ohm and the ampere were uncertain to 2 or 3 per cent., and I then scarcely hoped to get nearer than one part in a thousand. The recent work carried on at Bushey would seem to indicate that an accuracy of one part in ten thousand may have been attained. The possibility of such a refinement depends largely upon the use in the instruments of coils composed of a single layer of wire, the position of every turn of which is open to exact determination. The importance of this feature was insisted upon by the late Professor Jones.

Accuracy of measurement appeals less to the lay and scientific public than discoveries promising to open up new fields; but though its importance at any particular stage may be overrated, it promotes a much needed consolidation and security in the scientific edifice. A remarkable example of enhanced accuracy is afforded by modern measurements of luminous wave-lengths, for which we are mainly indebted to our Copley medallist. Not only did he introduce the vacuum tube charged with mercury or cadmium as the best source of homogeneous light, but by a most able use of an ingenious method he determined, with the highest precision, the values of the cadmium red, green, and blue wave-lengths in terms of one another, and of the metre. His work has been skilfully followed up by Fabry and Perot, and numerous wave-lengths are now known with a relative accuracy of one-millionth part. When we reflect upon the almost ultra microscopic magnitude of a wave-length of light, the possibility of such an achievement may well excite our astonishment.

For the advancement of science the main requirement is, of course, original work of a high standard, adequately explained and published. But this is not enough. The advances so made must be secured, and this can hardly be, unless they are appreciated by the scientific public. In some branches of Pure Mathematics it is said that readers are scarcer than writers. At any rate the history of science shows that important original work is liable to be overlooked and is perhaps the more liable the higher the degree of originality. The names of T. Young, Mayer, Carnot, Waterston, and B. Stewart, will suggest themselves to the physicist; and in other branches, doubtless, similar lists might be made of workers whose labours remained neglected for a shorter or a longer time. In looking into the more recent progress of Geometrical Optics, I have been astonished to find how little correlation there has been between the more important writings. That Coddington should have remained unknown in Germany and von Seidel in England need not greatly surprise us; but in this subject it would appear that a man cannot succeed in

making even his own countrymen attend to him. Coddington seems to have heard nothing of Cotes and Smith, and Hamilton nothing of Airy and Coddington.

It is true that no two writers on theoretical subjects could differ more in taste and style than do Hamilton and Coddington. The latter addressed himself to special problems, the solution of which seemed to have practical importance. Among his achievements was the rule relating to the curvature of images, generally known as Petzval's, although Petzval's work was of much later date. Hamilton, on the other hand, allowed his love of generality and of analytical developments to run away with him. In his Memoir on Systems of Rays, with its elaborate and rambling supplements, there is little to interest the practical optician, though the mark of genius is throughout apparent. It was only in two or three pages of a later paper that he applied his powerful methods to the real problem of Optics. As Finsterwalder has remarked, his "six radical constants of aberration," expressing the general properties of a symmetrical instrument, are at once an anticipation and a generalisation of von Seidel's theorems. But the published work is the barest possible summary. If Hamilton had been endowed with any instinct for Optics proper, he could have developed these results into a treatise of first-class importance. In more recent times Hamilton's footsteps have been followed by Maxwell as well as by Thiesen and Bruns, of whom the two latter do not seem to have realised that Hamilton (or even Maxwell) had concerned himself with the subject at all. The natural development of Hamilton's ideas will be found in an able memoir by Schwarzschild (1905).

I have spoken of English work that lay neglected, but a scarcely less notable instance is the splendid discovery of the microscopic limit by Fraunhofer, a man who combined in the highest degree practical skill with scientific insight. Thanks to the researches of Abbe and Helmholtz, it is now well known that there is a world that lies for ever hidden from our vision, however optically aided; but neither of these eminent men realised that the discovery had been anticipated by Fraunhofer. Some, perhaps, may doubt whether Fraunhofer's argument, founded upon the disappearance of spectra from gratings of extreme fineness, is of adequate cogency. To this I may reply that I was myself convinced by it in 1870, before either Abbe or Helmholtz had written a word upon the subject.

Enough has probably been said to illustrate my contention that much loss has ensued from ignorance and neglect of work already done. But is there any remedy? I think there ought to be. In all the principal countries of the world we have now a body of men professionally connected with science in its various departments. No doubt the attention of many of these is so

engrossed by teaching that it would be hard to expect much more from them, though we must remember that teaching itself takes on a new life when touched with the spirit of original enquiry. But in the older Universities, at any rate, the advancement of science is one of the first duties of Professors. Actual additions to knowledge occupy here the first place. But there must be many who, from advancing years or for other reasons, find themselves unable to do much more work of this kind. It is these I would exhort that they may fulfil their function in another way. If each man would mark out for himself a field—it need not be more than a small one—and make it his business to be thoroughly conversant with all things new and old that fall within it, the danger of which I have spoken would be largely obviated. A short paper, a letter to a scientific newspaper, or even conversation with friends and pupils, would rescue from oblivion writings that had been temporarily overlooked, thereby advancing knowledge generally and sometimes saving from discouragement an unknown worker capable of further achievements. Another service such experts might render would be to furnish advice to younger men desirous of pursuing their special subject.

The readers of whom I have been speaking are experts capable of advancing science themselves and of helping others to do so. But there is another class of possible readers of scientific books on behalf of whom I wish to make an appeal. We who are dependent upon sight in almost everything that we do must specially sympathise with those unfortunates who are deprived of this most precious gift. A movement is on foot, and has already received valuable support, to promote the publication of standard scientific works in embossed type suitable for the use of the blind. Such publication is costly and can hardly be undertaken upon an adequate scale without external aid. My friend, Mr. H. M. Taylor, a Fellow of this Society, tells me that in the course of the last 12 months he has written out the whole of Mr. C. Smith's Elementary Algebra in Braille type, has afterwards read the copy with his fingers and again, later, read the whole in proof. There can be no doubt that books in embossed type on such subjects as Mechanics, Physics, Astronomy, Geology, not to mention the various Biological Sciences, would be an immense boon to many blind readers. I commend the proposal heartily to your notice.

Another remedy for the confusion into which scientific literature is liable to fall may lie in the direction of restricting the amount of unessential detail that is sometimes prevalent in the publication of scientific results. In comparing the outputs of the present time, and of, say, 30 years ago, the most striking feature that appears is doubtless the increase of bulk, in recent

years coming especially from young workers stimulated by the healthy encouragement of direct research as a part of scientific education. But I think it may also be observed, and not alone in the case of such early dissertations, that there is, on the whole, less care taken for the concise presentation of results, and that the main principles are often submerged under a flood of experimental detail. When the author himself has not taken the trouble to digest his material or to prepare it properly for the press, the reader may be tempted to judge of the care taken in the work from the pains taken in its presentation. The tendency in some subjects to submit for immediate publication the undigested contents of note-books is one that we hear much of at the present time. It is a matter that is difficult for publishing bodies to deal with, except by simple refusal of imperfectly prepared material, with its danger of giving offence to authors of recognised standing, but it seems not unlikely that at present public scientific opinion would endorse such a course of action. A related difficulty and one that contributes to this trouble, is the tendency, noticeable in some public scientific organisations, to imagine that their activity is estimated by the number of pages of printed matter they can produce in the year. Probably no consideration is further removed than this from the minds of the educated public, whose judgment is alone worth considering.

MEDALLISTS, 1907.

Copley Medal.

The Copley Medal is awarded to Professor Albert Abraham Michelson, For. Mem. R.S., on the ground of his experimental investigations in Optics.

In 1879, Michelson brought out a determination of the velocity of light by an improved method, based on Foucault's, which gave 299,980 kilometres per second. Three years later, by means of a modification of the method, capable of even greater precision, he found for this constant, of fundamental importance for electric as well as optical science, the value of 299,853 kilometres.

Michelson has been a pioneer in the construction of interferometers, which are now indispensable in Optics and Metrology. With his new instrument, at Paris, he determined the absolute wave-lengths of the red, green, and blue lines of cadmium by counting the number of fringes (twice the number of wave-lengths) corresponding to the length of the standard metre of the Bureau International des Poids et Mesures. He found the metre to be 1,553,164 times the wave-length of the red line of cadmium, a result

which is almost in exact agreement with the redetermination last year by Perot and Fabry. Michelson thus proved the feasibility of an absolute standard of length, in wave-lengths, of such accuracy, that if the standard metre were lost or destroyed, it could be replaced by duplicates indistinguishable from the original.

He had the greatest share in the elaboration of precise experiments on the relative motion of ether and matter. He repeated in an improved form Fresnel's experiment of the speed of light in moving media, using water and sulphide of carbon. He found that the fraction of the velocity of the water by which the velocity of light is increased is 0·434, with a possible error of $\pm$ 0·02. The fact that the speed is less in water than in air shows experimentally that the corpuscular theory is erroneous; but his results, moreover, established the correctness of Fresnel's formula for the effect, the theory of which has since become well understood.

In conjunction with E. W. Morley, he devised and carried out a very remarkable method by which, on the assumption of ether at rest, an effect depending on quantities of the order $(v/V)^2$ would appear to be appreciable. No displacement of the fringes was found. Of this result the simplest explanation would be that the ether near the earth partakes fully in its orbital motion; but modern electric and optical science appears to demand a quiescent ether, and the existence of this and similar null results is fundamental for its theory.

He has shown the possible application of the Interferometer method to Astronomy, by himself measuring the diameters of the four satellites of Jupiter, which are only about one second of arc. He suggests the further application of the instrument to such of the fixed stars as may not subtend less than one-hundredth of a second of arc.

In 1898, Michelson constructed a spectroscope which enables us to make use of the great resolving powers of the very high orders of spectra which are absent in the use of the ordinary grating, and with the added advantage of having most of the light in one spectrum. The echelon consists of a pile of glass plates of precisely equal thickness, which overlap by an equal amount; with it spectral lines which appear single with the most powerful gratings can be resolved into components. This instrument has been especially useful for the direct observation of the important, because definite, influence of magnetism on light, discovered by Zeeman. With 30 plates, and using the 25,000th spectrum, the echelon has a resolving power of 750,000, while the most powerful gratings do not exceed 100,000.

In connection with the analysis of radiations, he has constructed and used various machines for the analysis of periodic motions. For example, in

conjunction with Stratton, he perfected a remarkable machine which is based on the equilibrium of a rigid body under the action of springs.

Professor Michelson has also investigated by his Interferometer the important subject, both theoretically and practically, of the breadth and the structure of spectral lines, including the effect of a magnetic field, and in various other ways his genius has opened up new ground in experimental Optics.

Royal Medals.

One of the Royal Medals has been awarded, with the approval of His Majesty, to Dr. Ernest William Hobson, F.R.S.

During the last 20 years Dr. E. W. Hobson has been distinguished for the fundamental character of his contributions to Mathematics and Mathematical Physics. His earlier published work, from 1888 onwards, deals largely with the so-called Harmonic Analysis, which embraces many topics having for their common aim the solution of the Potential Equation in forms suitable for application to the problems of Physics. The exhaustive examination of the general types of Harmonic Functions contained in his paper in the 'Phil. Trans.,' 1896, has been found to be of high utility for this application. He was led by these researches, and particularly by the difficulty of describing in general terms the characteristics of a function capable of being represented by Fourier's series, to take part in the revision of the logical basis of Differential and Integral Calculus which is now in progress; his Presidential Address to the London Mathematical Society, in 1902, on the questions here arising, aroused general interest among mathematicians; and he has recently (1907) published an extensive volume, dealing with the whole matter and its applications to the theory of Fourier's series, which is of great importance for the history and development of Mathematics.

His Majesty has also approved the award of a Royal Medal to Dr. Ramsay H. Traquair, F.R.S.

Dr. Traquair is honoured on the ground of his long continued researches on the fossil fishes of Palæozoic strata, which have culminated, within the past 10 years, in his discovery of new groups of Silurian and Devonian fishes, and in his complete exposition of the structure of *Drepanaspis*, *Phlyctenaspis*, and other remarkable forms.

For nearly forty years Dr. Traquair has been busy with the description of fossil fishes, mostly from the Palæozoic rocks of Scotland, and he is deservedly held to be one of the most eminent palæontologists of the day. He has been highly successful in the interpretation of the often very obscure and frag-

mentary remains which he has had to elucidate, and his restorations of fishes have won such credit as to appear in all modern text-books of Palæontology. It may be said that his work, notwithstanding the great difficulties of the subject, has well stood the test of time.

Dr. Traquair has done much to advance our knowledge of the osteology of fishes generally. His earliest memoirs on the asymmetrical skull of flat-fishes and on the skull of *Polypterus* remain models of exactness. His acquaintance with osteology enabled him to show how former superficial examination of the Palæozoic fishes had led to wrong interpretations. He demonstrated that *Chirolepis* was not an Acanthodian, as previously supposed, but a true Palæoniscid. In 1877 he satisfactorily defined the Palæoniscidæ and their genera for the first time, and conclusively proved them to be more nearly related to the Sturgeons than to any of the other modern Ganoids with which they had been associated. He thus made an entirely new departure in the interpretation of extinct fishes, replacing an artificial classification by one based on phylogenetic relationship. His later memoir on the Platysomidæ was equally fundamental and of the same nature.

All subsequent discoveries, many made by Traquair himself, have confirmed these conclusions, which are now universally accepted.

In 1878, Dr. Traquair demonstrated the Dipneustan nature of the Devonian *Dipterus*, and somewhat later he began the detailed study of the Devonian fishes. His latest researches on the Upper Silurian fishes of Scotland are equally important, and provide a mass of new knowledge for which we are indebted to his exceptional skill and judgment in unravelling the mysteries of early Vertebrate life.

Davy Medal.

The Davy Medal is awarded to Professor Edward Williams Morley.

Professor Edward W. Morley is well known both to chemists and to physicists for his work in the application of optical interferences and other physical phenomena to increase the accuracy of measurement. Numerous valuable papers have appeared, either in collaboration with Professor Michelson and others, or in his own name, on such subjects. Special reference may be made to his experiments, in conjunction with Professor Michelson, on the fundamental question of the absence of effect of translatory motion of material bodies on luminous phenomena.

His claim to the Davy Medal rests on grounds closely related to these researches; for he has combined thorough mastery of accurate measurement with an intimate knowledge of modern chemistry, and has utilised them in his attempt to solve one of the most difficult and fundamental problems of

chemical science. The special problem to which he has consecrated many years of his life is the determination of the relative atomic weights of hydrogen and oxygen; it has been attacked by him with rare insight and skill, and with indomitable perseverance, and he seems to have settled it for many years to come, if not permanently. All the recent work devoted to this problem, and there has been much, has tended to establish more firmly the ratio arrived at by Professor Morley.

His determinations of the absolute weights of a litre of hydrogen and of oxygen, and his investigations of the amounts of moisture retained by gases dried by various desiccating agents, are of the very greatest importance for scientific progress.

Sylvester Medal.

Professor Wilhelm Wirtinger, of Vienna, is the recipient of the Sylvester Medal.

He is distinguished for the importance and wide scope of his contributions to the general Theory of Functions. Our knowledge of the general properties and characteristics of functions of any number of independent variables, and our ideas for the further investigation of such functions are, for the most part, at present bound up with the Theory of Multiply-periodic Functions, and this Theory is of as great importance for general Solid Geometry as the ideas of Abel have proved to be for the Theory of Plane Curves. Professor Wirtinger has applied himself for many years to the study of the general problems here involved. A general summary of his researches is given by him in the Abel Centenary volume (xxvi, 1902) of the 'Acta Mathematica.' Two of his papers may be particularly referred to, both of 1895. One of these deals with the reduction of the Theory of General Multiply-periodic Functions to the Theory of Algebraic Functions, with a view to their expression by Theta functions; this was one of the life problems of Weierstrass, who did not, however, during his lifetime, publish anything more than several brief indications of a method of solution. Professor Wirtinger's memoir obtains a solution, and is, moreover, characterised throughout by most stimulating depth and grasp of general principles. This paper was followed by two others, one continuing the matter in detail, the other making an application of its principles to the general Theory of Automorphic Functions. Another extensive paper, which obtained the Beneke Prize of the Royal Society of Göttingen, deals with the general Theory of Theta Functions. In it he obtained results of far-reaching importance, for Geometry as well as for the Theory of Functions, the full development of which will require many years of work.

Hughes Medal.

The Hughes Medal is awarded to Principal Ernest Howard Griffiths.

Principal Griffiths has conferred great benefit on physical science by his series of measurements of fundamental constants, mainly in the domain of thermal and electric energy. At a time when the equivalent of the thermal unit in mechanical energy stood urgently in need of revision, he devoted himself to the problem with all the refinements and patient manipulation that could be devised, the result being a value for Joule's equivalent which at once acquired authority in the light of the evidence produced, and largely confirmed the corrections already advanced by Rowland and others. A main cause of discrepancy had been found to be the variation of the thermal capacity of water with the temperature; and by an investigation in which this variation was determined, Griffiths elucidated and correlated fundamentally the work of previous observers, from Joule onward. Of special importance also, in the domain of chemical physics, was an investigation of the depression of the freezing point of water by very dilute admixture of dissolved substances, wherein he verified, with all the refinement of absolute physical determinations, that the change of freezing point ran exactly parallel to the electric conductivity when the dilution of the electrolysable salt was comparable to that of gases, being twice as much per molecule as the standard value of the depression for non-electrolytes.

Buchanan Medal.

The Buchanan Medal is awarded to Mr. William Henry Power, C.B., F.R.S. Mr. Power's services to Hygienic Science and Practice have extended over a period of more than thirty years, and have been of the most distinguished kind. He has himself personally conducted successful enquiries into the causes of the spread of various diseases, and has obtained results which have proved of the greatest benefit to mankind. Moreover, in his long connection with the medical department of the Local Government Board, he has planned and directed numerous general and local investigations whereby our knowledge of disease, and of the methods of coping with it, have been greatly increased. The medical reports issued by the Local Government Board, which are universally regarded as among the most important contributions of our time to this subject, have for many years past been either written by him or owe much to his editorial criticism and supervision. It is not too much to say that no living man in this country has advanced the cause of scientific hygiene more than Mr. Power, or is more worthy of the distinction of the Buchanan Medal.